

Oral Health Research Review

Making Education Easy

Issue 5 – 2010

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Independent commentary by Jonathan Leichter DMD, Cert Perio (Harvard). Dr Leichter is currently Senior Lecturer in the Department of Oral Sciences at the University of Otago. Dr Leichter joined the faculty after 20 years in fulltime private practice in New York and Boston, 18 of which were spent in specialist practice limited to periodontology and implant dentistry. Trained at Tufts University and obtaining his specialist training at Harvard University, he has been actively involved in clinical dental implant practice since 1984. Since 2002, he has supervised and mentored postgraduate students in periodontology, endodontics and prosthodontics. His research interests and publications are in the field of periodontology, dental trauma and laser applications in dentistry.

Welcome to issue five of Oral Health Research Review.

This edition includes a paper reporting differences in the erosive potential of soft drinks and juices available in the UK versus comparable drinks in the US. There is also a paper on the effects of maternal periodontal disease on unborn children, this one reporting a significant relationship with preterm and extreme preterm birth. We also see that a herbal product containing *Acacia Arabica* was effective in patients with gingivitis, and the relationships between dental/oral diseases and methamphetamine (MA) abuse are explored. Rachel Perrott has provided the Dental Hygienist's commentary for this edition.

We hope you find this edition helpful in your everyday practice, and we look forward to hearing from you with any feedback you may have for us.

Kind regards,

Jonathan Leichter D.M.D

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Effect of in-office bleaching on color and roughness of composite restorations

Authors: Hafez R et al

Summary: Composite colour changes and surface roughness following in-office bleaching were investigated in 12 discs prepared from two shades (A2 and A4) of composites (Durafil VS and TPH3). The specimens were bleached (Beyond, LumaWhite-Plus and Opalescence-Boost), stained in a coffee solution for 48 hours and then rebleached. The composites' original colour was not notably altered by any of the bleaching systems. The Durafil VS composites exhibited a greater degree of staining than the TPH3 composites after exposure to the coffee solution. Significant whitening was also seen in the Durafil VS, but not in the TPH3 composites. Bleaching significantly affected surface roughness, with varying results depending on the composite shade and the bleaching product used.

Comment (JL): As the demand for improved aesthetics increases and more patients express an interest in in-office bleaching, it is important for us to be well informed so that we can knowledgeably discuss both the advantages and disadvantages of any procedure with our patients. The purpose of this study was to determine colour change and surface roughness of microfilled and microhybrid composite resins when subjected to coffee staining and bleaching using different in-office bleaching systems. Although many studies have looked at the effect of bleaching on natural teeth, its effect on composite restorations is not yet fully known. It was found that none of the bleaching systems used notably changed the colour of any of the composites. Advising patients that their restorations may need replacement after an in-office bleaching is thus strongly advised. Surface roughness appeared to be dependent on both the material used and the bleaching agent used. This is of clinical significance, as surface roughness will not only promote bacterial plaque adhesion with increased subsequent staining, but will also result in a dull appearance due to decreased light reflection. Both of these factors need to be taken into account when advising patients about this elective procedure.

Comment (RP): An interesting article that is especially applicable to the dental hygienist, as in-house bleaching is predominantly done by a hygienist. It is important for the dental hygienist and dental team to be aware of the effects of bleaching on not only natural tooth surface, as has been widely researched in the past, but also on tooth-coloured composite restorations. Being aware of the composition of various restorative materials, as shown in this article, is important as different composite materials respond differently to both staining and bleaching. When using one of the common restorative materials and in-office bleaching systems as used in this study, the conclusions from this research can aid the practitioner to make more informed treatment plans with a better prognosis for a successful outcome.

Reference: Eur J Dent 2010;4(2):118-27

http://www.eurjdent.com/images/Volume_4/4-118-127.pdf

Independent commentary by Rachel Perrott. Rachel Perrott received her Diploma in Dental Hygiene in 2003 from the University of Otago. After graduating, she returned to work in Auckland in two group practices developing and implementing hygiene programmes.

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Influence of gender and social factors on oral health, treatment degree and choice of dental restorative materials in patients from a dental school

Authors: Willershausen B et al

Summary: This study showed that in a cohort of 2374 outpatients from a German university dental school, women were significantly more likely than men to undergo restorations and crown placement, and to receive fillings that were tooth coloured. More expensive restorations were performed more often in patients with a higher education, while patients with a lower level of education tended to opt for inexpensive restorations. Lower levels of carious lesions were seen in patients with private health insurance.

Comment (JL): The aim of this study was to determine if relationships exist between gender, educational level, oral health and choice of restoration. It has been documented in many studies that social factors influence a person's attitude towards general and oral health, and that deprived segments of the population show a higher risk of getting some diseases. A dental history was obtained from the patients in this study, they were dentally assessed (clinical examination and OPG), and information regarding their level of education and current job was obtained, which categorised them into one of four social categories. The authors found a correlation between level of education and number of teeth present, but no distinct connection between level of education and choice of materials, with more expensive restorations found in both educated and less educated persons. However, the inclusion of only patients from a dental school, where treatment is more affordable, does mean that it was not a representative sample and cannot be extrapolated to the general population.

Comment (RP): This is a relatively broad study looking at a range of factors (gender, education and social factors) influencing dental treatment in a university hospital in Germany. Some interesting data were presented showing statistically more aesthetic dentistry done in female patients. Previous research referenced in this article has shown the correlation between social factors and dental health; this is perhaps more pertinent to the dental hygienist as it shows a more at-risk population. As the authors stated however, this study represents a fairly specific sector of society, those who are seeking affordable treatment at a dental hospital. For those practitioners who are mainly working in a university hospital setting, this article may be of particular interest.

Reference: *Int J Dent Hygiene* 2010;8(2):116-20

<http://www3.interscience.wiley.com/journal/122523724/abstract>

Short-term clinical effects of commercially available gel containing *Acacia Arabica*

Authors: Pradeep AR et al

Summary: This RCT involved 90 patients with chronic generalised gingivitis who were randomised to receive a commercially available herbal gel containing *Acacia Arabica* (Gumtone), 1% chlorhexidine gel or placebo for 6 weeks. Baseline gingival index and plaque index scores were compared with 2, 4 and 6 week scores, and a subjective evaluation was undertaken at each of these visits. The *Acacia Arabica*-containing gel resulted in clinical improvements in gingival and plaque indices that were significantly better than placebo and comparable with chlorhexidine gel. Furthermore, the herbal gel did not discolour teeth or have the unpleasant taste associated with chlorhexidine gel.

Comment (JL): *Acacia Arabica* is a traditional oral hygiene substance used in the Middle East and North Africa and available commercially as Gumtone gel. As many of its constituents have antimicrobial properties, the authors carried out this clinical trial to evaluate its short-term clinical effects on the reduction of plaque and gingival inflammation. The results showed that significant reductions in gingival index and plaque index scores were observed for both the gumtone and chlorhexidine groups with no significant difference between them. An unpleasant taste and tooth discolouration was reported by 44% of the subjects in the chlorhexidine group. It would appear from this study that *Acacia Arabica* gel could be a useful therapeutic agent suitable for use over an extended period. It does not cause discolouration, tastes acceptable and its efficacy is comparable with chlorhexidine.

Comment (RP): This study appears to show the efficacy of *Acacia Arabica* in treating the effects of gingivitis in the short term. While the conclusions seem quite convincing, it would be of interest to see similar research undertaken on a larger sample size over a longer study period. Also, the conclusions would have greater significance if this had been a completely independent study. This study was partially funded by Pharma Pvt. Ltd, India, the manufacturer of the commercially available Gumtone Gel, as used in this study. Notwithstanding, as health professionals providing holistic dental care, we do need to be aware of the various herbal remedies that are available to treat dental disease. Keeping up to date with the latest research on products such as Gumtone Gel will enable us to give patients an educated opinion as to the efficacy of such herbal remedies.

Reference: *Aust Dent J* 2010;55(1):65-9

<http://www3.interscience.wiley.com/cgi-bin/fulltext/123313024/HTMLSTART>

Systematic review on the effect of rinsing with povidone-iodine during non-surgical periodontal therapy

Authors: Sahrman P et al

Summary: This meta-analysis of studies that compared the additional benefits of povidone-iodine as an adjunct to scaling and rootplaning with water, saline rinsing or no rinsing in patients undergoing nonsurgical treatment for chronic periodontitis revealed that povidone-iodine was associated with small, but statistically significant, enhanced probing pocket depth reductions of 0.28mm. The included studies were mostly of low quality with a variety of treatment modalities used, but there was no significant heterogeneity among them. Povidone-iodine was found to provide additional benefit in single-rooted teeth after scaling and rootplaning, particularly if repeated during the healing stage.

Comment (JL): Povidone-iodine, an antiseptic with a broad antibacterial spectrum, is used by some practitioners during subgingival debridement. However, not all studies show that this provides any additional benefits, and results have been inconsistent. The authors of this paper carried out an electronic systematic review using Pubmed, Embase and the Cochrane Central Library, looking at all articles up to and including November 2008 that included the words PVP-iodine, iodine, or PVP and periodontitis or periodontal. A manual search of the Journal of Clinical Periodontology, Journal of Periodontal Research and Journal of Periodontology was also carried out. After all 186 potentially eligible studies were assessed and those studies that did not fit the criteria were excluded, six studies remained. These included data from 404 patients. After comparing all data, the authors concluded that povidone-iodine rinsing during deep scaling and rootplaning produces a small, but statistically significant, effect with a reduction of probing depth in patients with chronic periodontitis. More clinical studies are needed as the application of povidone-iodine represents an inexpensive and nonhazardous way to improve treatment outcomes.

Comment (RP): This review looked at available research and literature on the use of povidone-iodine as an adjunct to scaling and rootplaning treatment. The conclusion reached from this meta-analysis is that there was a statistically significant improvement in the pocket depths (0.28mm) following treatment. Only six articles were included in this study, and as the authors note, these studies were of low quality and variable methodology. For the dental hygienist, the improvement in pocket depth of 0.28mm would be of little clinical significance. One benefit of povidone-iodine is that, unlike other adjuncts to nonsurgical periodontal therapy, it has few adverse side effects.

Reference: *J Periodont Res* 2010;45(2):153-64

<http://www3.interscience.wiley.com/journal/122680682/abstract>

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Comparison of in vitro erosion potentials between beverages available in the United Kingdom and the United States

Authors: Murrell S et al

Summary: This study comparing the physicochemical properties and erosion potential of drinks found significant differences in pHs, titratable acidities and fluoride levels among a number of beverages available in the UK and their US counterparts. Lesion depths were significantly greater in teeth exposed for 25 hours to apple juice, orange juice, Diet Coke®, Sprite® and Sprite Zero® from the UK, compared with their US counterparts ($p < 0.05$), with significant associations between lesion depth and both pH ($p = 0.01$) and country of origin ($p = 0.002$).

Comment (JL): It has been suggested that different prevalence rates of erosion exist between Europe and the US. Erosion, the pathological, chronic loss of tooth structure resulting from chemical removal of enamel and/or dentine, has been named as the most common and destructive form of tooth wear and is becoming an increasing concern in the UK. This study aimed to compare the erosion potentials of a range of commonly consumed drinks with 11 matched beverage pairs from the UK and the US. Extracted, caries-free molars and premolars were used to determine the depth of lesions resulting from immersion in the beverages. The results showed that some of the UK beverages did have higher erosive potentials than the equivalent beverages in the US. Lesion depths were greater in both natural (apple and orange) juices and processed beverages (Diet Coke®, Sprite®) from the UK. It is not known why the differences occur, but the authors speculate that product formulations may differ between countries. We must also keep in mind that dietary habits and food patterns do differ between countries. Here in NZ, I am constantly taken aback by the number of patients of all ages who have lost significant amounts of tooth structure as a result of erosion. I wonder how our beverages would compare.

Comment (RP): The authors undertook this research due to a disparity that exists between reported erosion in the UK and the US, with the UK being significantly greater. They hypothesised that drinks have a greater erosive potential in the UK compared with the US. The conclusions did in fact reveal that some UK drinks, particularly orange and apple juices, have a greater erosive potential. The application in the dental clinic is hindered by certain limitations noted in this study, such as this study being an *in vitro* study, which disallows for any protective response in the individual's mouth (i.e. remineralisation by the saliva). Also, this study did not allow for individual lifestyle factors, such as when, where and how beverages were consumed. These aspects are of particular significance to a dental hygienist, as oral hygiene instruction and education is such a powerful tool in combating tooth erosion.

Reference: *J Dent* 2010;38(4):284–9

<http://tinyurl.com/JDent-38-284>



Oral Health Research Review is also made available to Dental Hygienists through the kind support of the New Zealand Dental Hygienists' Association

The effectiveness of a preprocedural mouthrinse containing cetylpyridinium chloride in reducing bacteria in the dental office

Authors: Feres M et al

Summary: In this study, 60 patients receiving oral prophylaxis with an ultrasonic scaler were randomised to receive a preprocedural rinse containing 0.05% cetylpyridinium chloride, 0.12% chlorhexidine or water, or no rinsing. The two treatments were both significantly better at reducing spatter bacteria levels than rinsing with water and no rinsing, which were associated with higher proportions of *Fusobacterium* spp. and lower proportions of *Capnocytophaga* spp. than the treatment groups. The investigators added that cetylpyridinium chloride may be a good alternative to chlorhexidine due to fewer side effects.

Comment (JL): The spray produced by an air-water syringe, an ultrasonic scaler, or a high-speed handpiece is found in the greatest concentration within two feet of the patient – just where the operator is sitting. One of the aims of our infection control is to reduce or eliminate the exposure of patients and dental staff members to aerosolised micro-organisms. The use of a preprocedural mouthrinse that contains an antiseptic agent has been found to be effective in reducing viable bacteria in the mouth. As some oral micro-organisms have been implicated in the development of infectious diseases such as ophthalmic and respiratory infections and tuberculosis, it makes sense that a reduction in the levels of bacteria in oral splatter can only be a good thing. The authors of this paper evaluated the efficacy of a mouthrinse containing 0.05% cetylpyridinium chloride, which is commercially available as Plax® (Colgate). Cetylpyridinium chloride penetrates the bacterial cell membrane, causing leaking of cell components, disruption of cell metabolism and inhibition of cell growth, which ends in cell death. Their results showed that the cetylpyridinium chloride mouthrinse was as effective as a chlorhexidine mouthrinse in reducing viable bacteria in oral splatter. Having an alternative mouthrinse that we know is effective will be helpful for those patients who dislike the unpleasant taste of chlorhexidine, or develop tooth or tongue staining or mucosal irritation when using it.

Comment (RP): Minimising the spread of infection in the dental office should always be a top priority. As this article states, recent research has suggested a possible association between dental office micro-organisms and ophthalmic or acute respiratory infections and tuberculosis. The authors of this study have undertaken a thorough analysis of the antibacterial properties of a preprocedural mouthrinse cetylpyridinium chloride (Plax®). The results showed cetylpyridinium chloride to be an effective antibacterial preprocedural mouthrinse, just as effective as a chlorhexidine-containing rinse. The rinse effectively reduced bacterial spatter on the patient and the dentist. Obviously, this study is not completely independent, as it was sponsored by Colgate-Palmolive, the manufacturer of Plax® mouthrinse.

Reference: *J Am Dent Assoc* 2010;141(4):415–22

<http://jada.ada.org/cgi/content/abstract/141/4/415>

Maternal periodontal disease and preterm or extreme preterm birth: an ordinal logistic regression analysis

Authors: Guimaraes AN et al

Summary: In this study, two types of multivariate analyses of data from 1207 women revealed associations between periodontal disease and: a) fewer weeks of gestation; and b) preterm or extreme preterm birth. These associations were significant regardless of which of the following two definitions of periodontal disease were used: 1) ≥ 4 teeth with a probing depth ≥ 4 mm and clinical attachment loss ≥ 3 mm in ≥ 1 site, and 2) ≥ 1 site with probing depth and clinical attachment loss ≥ 4 mm.

Comment (JL): It has been reported that a preterm birth is the main cause of neonatal mortality, along with both long- and short-term sequelae for the child. Infections, with periodontal disease included in this category, are listed as one of the risk factors for both preterm (<37 weeks) and extreme preterm births. It has been suggested that periodontal disease induces early delivery either through raised systemic levels of pathogenic organisms or their endotoxins, or via inflammatory mediators such as prostaglandin E₂, interleukin-1 or tumour necrosis factor- α . This cross-sectional study included 1686 women. All their clinical records were reviewed by a gynaecology and obstetrics physician, and a periodontal examination was carried out at the hospital within 48 hours of childbirth by two calibrated periodontists. The results of this study indicated that, as has been found in other studies, there is a link between maternal periodontal disease and spontaneous preterm or extreme preterm birth. The authors do feel though that more studies conducted on larger numbers of women are needed, as the prevalence of extreme prematurity is low (1–2% for the general population) and was only 1.2% in their series.

Comment (RP): In the last 10 years, there has been a lot of research undertaken to ascertain the association between maternal periodontal disease and the effects on the unborn child. The general consensus, as this article maintains, is that amongst other risks, the risk of delivering a baby prematurely or extremely prematurely is significant in mothers who have periodontal disease. The degree of risk, or probability of a premature birth occurring, differs according to various studies, as the authors point out. The obvious message for dental professionals is that periodontal health and education for pregnant women needs to be a top priority.

Reference: *J Periodontol* 2010;81(3):350–8

<http://www.joponline.org/doi/abs/10.1902/jop.2009.090527>

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Periodontitis as a risk factor for cerebrovascular accident: a case-control study in the Indian population

Authors: Pradeep AR et al

Summary: This study found that mean plaque and gingival indices, probing pocket depth and clinical attachment loss values were significantly higher among 100 patients with cerebrovascular accident (CVA) than 100 controls. A logistic regression analysis revealed that probing pocket depths >4.5mm were associated with a significantly increased risk of stroke (adjusted OR 8.5 [95% CI 1.1, 68.2]), followed by hypertension and smoking.

Comment (JL): This case-control study included 100 patients with acute cerebral ischaemia and 100 age- and gender-matched controls. Patients ranged from 33 to 68 years of age. A medical health questionnaire was completed, participants screened for hypertension, diabetes, total serum cholesterol level and a history of stroke. An oral examination was carried out by a trained and calibrated examiner with measurements of probing pocket depth and clinical attachment loss (distance between probed base of pocket and CEJ) in all teeth at four sites. Plaque index and gingival index were recorded. Several causal pathways (direct and indirect effects of periodontal infection) and noncausal pathways (genetic and host factors) have been postulated to explain the association of periodontitis with atherosclerosis and coronary heart disease. The authors concluded that, as the mean values recorded were significantly higher in the CVA patients than in the controls, it is clear that periodontitis may be a potential risk for stroke. They suggest that better control of periodontal disease may contribute to a decline of CVA, but do acknowledge that further studies are necessary to verify and quantify the role that oral infections play in the process of atherosclerosis.

Comment (RP): While research has been done in other countries investigating the correlation between chronic periodontal disease and cerebrovascular disease, this is the first study to look specifically at an Indian population. The results from this study suggest that in this population sample, those who suffer from chronic periodontal infection are 8.5 times more likely to suffer from a cerebrovascular accident. These results are significantly higher than previous findings from similar studies. As the authors point out, periodontal therapy can be done quite safely, so it may be postulated that better maintenance of periodontal disease could presumably reduce the occurrence of CVAs. Other studies have found similar correlations between periodontal disease and cardiovascular disease. For the dental team, this reinforces the importance of thorough periodontal treatment aiming at eliminating the disease state in the mouth, thus reducing the detrimental effects the inflammatory response can have on the cardiovascular system.

Reference: *J Periodont Res* 2010;45(2):223-8

<http://www3.interscience.wiley.com/journal/122605011/abstract>

The relationship between methamphetamine use and increased dental disease

Authors: Shetty V et al

Summary: This study found that dental and oral diseases accounted for 41.3% of comorbidities among 301 otherwise healthy individuals with methamphetamine (MA) dependence. Compared with control subjects, MA users also had significantly more missing teeth (4.58 vs. 1.96; $p < 0.001$) and more reported oral health problems ($p < 0.001$), with 28% of MA users expressing concerns about their dental appearance, 23.3% reporting broken or loose teeth and 22.3% reporting bruxism or erosion. Intravenous MA use was significantly associated with missing teeth compared with smoking/inhaling MA (OR 2.47 [95% CI 1.3, 4.8]).

Comment (JL): MA is rapidly becoming the drug of choice for recreational drug users. Although this article was published in an American journal, this is not a phenomenon limited to the US. No one who watches the news or reads the newspaper in NZ can fail to be aware of how regularly 'P' features in our headlines. 301 MA-dependant adults participated in this study, which looked at rates of dental problems, dental disease, dental comorbidities and the influence that mode of drug administration had on oral health. The MA-users were compared with a similar group of non-MA users. The most frequent physical examination findings in the MA group were elevated BMI, abnormal dental or oral findings, hypertension and mental status abnormalities. Almost 60% of the MA users had one or more missing teeth, 30.9% had overtly carious and broken-down teeth and 4.3% had a lesion or abnormality of the oral mucosa. The oral health of users who injected the drug was worse than that of users who smoked or inhaled it. The authors suggest that dental disease may provide a temporally stable MA-specific medical marker to help identify MA users. Dental professionals could play a crucial role in the early detection of MA use and participate as integral members of the care team for these people.

Comment (RP): This study takes a thorough look at the correlation between MA use and dental disease using an impressive sample size. This study concluded that rampant dental disease in an otherwise healthy individual may be a potential marker for undisclosed MA use, and also that the MA user is often concerned with dental appearance. The authors suggest that the dental health professional may be able to detect MA abuse and utilise dental self image as a tool for interventions in the dental office or to direct the patient to substance abuse treatment programmes. This opens up a lot of scope and responsibility for the dental profession. Taking a thorough medical history and discussing this with each patient has always been the building block of successful treatments, and this research highlights the importance of this. The ramifications of being able to assist an MA user with recovery are huge, and staff training in this area would be very helpful.

Reference: *J Am Dent Assoc* 2010;141(3):307-18

<http://jada.ada.org/cgi/content/abstract/141/3/307>

Dynamics of tooth erosion in adolescents: a 3-year longitudinal study

Authors: El Aidi H et al

Summary: This longitudinal study of 622 children aged 10-12 years at baseline and followed for 3 years into adolescence reported tooth erosion rates of 30.4% and 44.2% in children aged 11 and 15 years, respectively, with respective deep enamel or dentin erosion rates of 1.8% and 23.8%. Higher socioeconomic status was significantly associated with a lower incidence of upper incisor erosion, while a lower incidence of first molar erosion was significantly associated with female gender. As age increased, there were significant decreases in: a) the incidence of new tooth surfaces exhibiting erosion in children with no erosion, while children with erosion exhibited unchanged progression; and b) the incidences of erosion in upper incisors and lower first molars.

Comment (JL): Very few longitudinal studies on tooth erosion have been carried out, with only three assessing the incidence of tooth erosion in adolescents. The children in this study were re-examined twice over 3 years, with only a 9.8% loss to follow-up. A full-mouth recording of the buccal, occlusal and lingual surfaces of the permanent teeth was performed by two calibrated examiners, and the extent of tooth erosion was recorded using a tooth erosion index code. The socioeconomic status of the children was also assessed using their residential postal codes. On a mouth level, the prevalence of tooth erosion was 30.4% in 11-year-olds, 38.3% in 12-year-olds and 44.2% in 15-year-olds. Significantly more boys than girls had erosion, as did children from a low socioeconomic background. Results showed that the progression in severity score in children who already displayed signs of tooth erosion was also higher in boys than in girls, but did not increase with age and no differences were found between socioeconomic groups. In children who were erosion free, the incidence of new tooth surfaces showing erosion decreased significantly with age.

Comment (RP): This is an interesting longitudinal study that looked at many factors that may affect tooth erosion in adolescents. The conclusions reached by the authors do not seem to prove or disprove pre-existing theories related to tooth erosion. It is apparent that socioeconomic background and gender may play a role in the prevalence and progression of tooth erosion. It would be helpful to see further research on the direct relationships between socioeconomic factors, gender, etc, with applicable factors such as diet included in the research. It was interesting to note that the study was supported by the Dutch Dairy Association, Dutch Sugar Bureau and Dutch Soft Drinks Association.

Reference: *J Dent* 2010;38(2):131-7

<http://tinyurl.com/JDent-38-131>

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